THE POTENTIAL ROLE OF SOIL METAL TOXICITY IN MARSH DIEBACK

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The recent mass marsh-vegetation die-off does not appear to have coincided with a sudden increase in levels of heavy metals or other environmental contaminants. However, there are several other potential mechanisms for metals to be involved in marsh vegetation mortality. This presentation will identify these mechanisms, discuss the potential for their involvement in the marsh dieback and the implications this metal toxicity would have for marsh restoration efforts, and, finally, outline a research effort aimed at investigating the role of soil metal toxicity.

Two types of processes could potentially have led to metal toxicity. First, the extended drought conditions could have resulted in metals already present in the environment becoming concentrated in the remaining pore water. Second, changes in salinity, pH and especially redox potential of marsh soil could have resulted in changes in metal speciation and metal bioavailability. The effects of changes in salinity and pH on soil metal bioavailability are likely to be more straightforward than the effects of changes in soil redox conditions on metal bioavailability. The influence of soil redox potential on metal bioavailability is rather complex, with many metals being redox sensitive, with effects of redox potential not being unidirectional over the range of redox conditions, and with effects differing among metals. The research proposed to address the potential role of metal toxicity in the marsh dieback will involve both greenhouse and field approaches. In the field, levels of Fe, Mn, Se, Cu, Cr, Zn will be determined in both plants and soil along a gradient of severity of marsh dieback. In the greenhouse, the metal sensitivity of *Spartina alterniflora* will be determined. In addition, the various scenarios of environmental conditions hypothesized to have been responsible for the marsh vegetation dieback (e.g., repeated drying and flooding with fresh water or salt water) will be recreated, and the influence of these conditions on metal dynamics and plant performance will be investigated.